Interview Summary	Application No.	Applicant(s)	
	10/628,612	SHIMIZU ET AL.	
	Examiner	Art Unit	
	Geoffrey L. Knable	1733	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Geoffrey L. Knable*. (3)_____.

(2) *Herbert F. Ruschmann*. (4)_____.

Date of Interview: *06 July 2006*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *2-11*.

Identification of prior art discussed: *n/a*.

Agreement with respect to the claims f)☒ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *See Continuation Sheet*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Following applicant's request for an interview along with proposed amendments to the claims (made of record as an attachment to this office action), agreement was reached on changes to the claims in order to overcome the 112 rejections of record and place this application into condition for allowance. Applicant submitted a facsimile copy of the claims with the agreed upon changes as well as a replacement copy of the previously submitted substitute specification (to avoid the minor legibility issues from the prior substitute specification) for inclusion with the examiner's amendment in order to effect these changes (full copy of this submission made of record as an attachment to this Interview Summary). Applicant also requested and authorized a 3 month extension of time and fee change of $1020 to deposit account 10-1250 in order to make this examiner's amendment.

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)
In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Docket No. F-7906

RESPONSE UNDER 37 CFR 1.116
EXPEDITED PROCEDURE
EXAMINING GROUP 1733

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Kentaro SHIMIZU, et al.
Serial No.	:	10/628,612
Filed	:	July 24, 2003
For	:	METHOD FOR WINDING STRIPS ON A TIRE BUILDING MACHINE
Group Art Unit	:	1733
Examiner	:	Geoffrey L. Knable
Confirmation No.	:	
Customer No.	:	000028107

Attachment to 7-6-2006 Interview Summary

OK 7/6/06

Certificate of Facsimile Transmission Under 37 CFR 1.8

I hereby certify that this correspondence is being transmitted in accordance with 37 CFR §1.6(d) to the United States Patent Office addressed to COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450 on July 5, 2006 to facsimile no. 571 273 1220.
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PLEASE TRANSMIT ACKNOWLEDGMENT TO 212 953 7733

Herbert F. Ruschmann — H F Ruschmann
(Name) (Signature)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUBMISSION OF APPLICANT INITIATED INTERVIEW REQUEST FORM

Sir:

F-7906 Ser. No. 10/628,612

In accordance discussions with the Examiner on July 3, 2006, applicant submits herewith an Applicant Initiated Interview Request Form requesting a telephone on the previously agreed to date of July 6, 2006, at 3pm.

Respectfully submitted,

Jordan and Hamburg LLP

By _____
Herbert F. Ruschmann
Reg. No. 35,341
Attorney for Applicants

Jordan and Hamburg LLP
122 East 42nd Street
New York, New York 10168
(212) 986-2340

PTOL-413A (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Applicant Initiated Interview Request Form

Application No.: 10/628,612 First Named Applicant: Kentaro SHIMIZU, et al.
Examiner: Geoffrey L. Knable Art Unit: 1733 Status of Application: Office Action issued

Tentative Participants:
(1) Geoffrey L. Knable (2) Herbert F. Ruschmann
(3) _____ (4) _____

Proposed Date of Interview: July 6, 2006 **Proposed Time:** 3 pm **(AM/PM)**

Type of Interview Requested:
(1) [X] Telephonic (2) [ ] Personal (3) [ ] Video Conference

Exhibit To Be Shown or Demonstrated: [ ] YES [ ] NO
If yes, provide brief description: _____

Issues To Be Discussed

Issues (Rej., Obj., etc)	Claims/ Fig. #s	Prior Art	Discussed	Agreed	Not Agreed
(1) 112, 2nd Para.	2-11		[ ]	[ ]	[ ]
(2) 112, 1st Para	2-7		[ ]	[ ]	[ ]
(3)			[ ]	[ ]	[ ]
(4)			[ ]	[ ]	[ ]

[X] Continuation Sheet Attached A listing of proposed claim amendments is provided.

Brief Description of Arguments to be Presented:
Regarding the 112, 1st and 2nd paragraph rejections, claim 2 is now amended to remove relation between directions of sensors relative to the drum and to merely relate sensors by the positions at which they are directed at along the path of rotational advancement of the drum. Distinction is further made between positions along the path of advancement and positions on the surface of the drum. Remaining informalities are also address in the proposed claim amendments.

An interview was conducted on the above-identified application on _____.

NOTE: This form should be completed by applicant and submitted to the examiner in advance of the interview (see MPEP § 713.01).

This application will not be delayed from issue because of applicant's failure to submit a written record of this interview. Therefore, applicant is advised to file a statement of the substance of this interview (37 CFR 1.133(b)) as soon as possible.

_____ _____
Applicant/Applicant's Representative Signature Examiner/SPE Signature

Herbert F. Ruschmann
Typed/Printed Name of Applicant or Representative

35,341
Registration Number, if applicable

Docket No. F-7906 Ser. No. 10/628,612

Interview Request Continuation Sheet

PROPOSED CLAIM AMENDMENTS
FOR INTERVIEW OF July 6, 2006

1. (Canceled)

2. (Currently Amended) A method of winding a strip member on a drum of a tire building machine in a winding operation building a tire, comprising:

providing a first strip end sensor directed at said drum ~~in a direction~~ at a first position along a path of rotational advance of a surface of said drum which is angularly displaced along [[a]] said path of rotational advance ~~of said drum~~ from an angular position along said path of rotational advance whereat said strip member is brought into initial contact with said drum in order to detect a first detection position on said surface of said drum whereat said strip member is brought into initial contact with said drum;

providing a second strip end sensor directed at a second position along said path of rotational advance of said surface of said drum [[and]] which is angularly displaced from said first position along said path of rotational advance at which said first strip end sensor directed;

providing [[a]] an angle detector to detect an angle of rotation of said drum;

rotating said drum in a drum rotational direction while delivering a front end of said strip member to said drum to begin wrapping said strip member on said drum;

detecting said front end of said strip member at said first detection position using said first strip end sensor and initiating a first angular measurement using said angle detector;

detecting arrival of said front end of said strip member at said second strip end sensor;

completing said first angular measurement using said angle detector and initiating a second angular measurement when said front end of said strip member is detected by said second strip end sensor and continuing to rotate said drum in said drum rotational direction;

calculating a first angle representing angular displacement from said second strip end sensor to said first strip end ~~senor~~ sensor in the drum rotational direction based on output from said angle detector;

detecting arrival of a trailing end of said strip member at said first strip end sensor brought about by rotating said drum in said drum rotational direction;

completing said second angular measurement using said angle detector when said trailing end of said strip member is detected by said first strip end sensor to yield a second angle; and

calculating an overlap length if said second angle is greater than said first angle and calculating a gap length if said second angle is less than said first angle.

3. (Currently Amended) The method of claim 2 wherein:

said overlap length is calculated using the formula

$$X=(D + 2t)\pi \times ((\theta_1 - \theta_0)/360)$$

when said second angle is greater than said first angle, where:

X=said [[gap]] overlap length;

D=a diameter of said drum;

t= a thickness of said strip member;

θ_0= said first angle; and

θ_1= said second angle; and

said gap length is calculated using the formula

$$Y=(D + 2t)\pi \times ((\theta_0 - \theta_2)/360)$$

when said first angle is greater than said second angle and where θ_2 equals said second angle and Y equals said gap length.

4. (Previously Presented) The method of claim 3 further comprising:

determining whether one of said overlap length and said gap length is outside an allowable range; and

stopping the winding operation of the tire in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

5. (Previously Presented) The method of claim 3 further comprising:

determining whether one of said overlap length and said gap length is outside an allowable range; and

sounding an alarm in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

6. (Previously Presented) The method of claim 2 further comprising:

determining whether one of said overlap length and said gap length is outside an allowable range; and

stopping the winding operation of the tire in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

7. (Previously Presented) The method of claim 2 further comprising:

determining whether one of said overlap length and said gap length is outside an allowable range; and

sounding an alarm in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

8. (Previously Presented) A method of winding a strip member on a drum of a tire building machine, comprising:

providing a first strip end sensor directed at a first detection position on said drum whereat said strip member is brought into initial contact with said drum;

providing a second strip end sensor directed at said drum and angularly displaced from said first strip end sensor;

providing a an angle detector to detect an angle of rotation of said drum;

rotating said drum in a drum rotational direction while delivering a front end of said strip member to said drum to begin wrapping said strip member on said drum;

detecting said front end of said strip member using said first strip end sensor and initiating a first angular measurement using said angle detector;

detecting arrival of said front end of said strip member at said second strip end sensor;

completing said first angular measurement using said angle detector and initiating a second angular measurement when said front end of said strip member is detected by said second strip end sensor and continuing to rotate said drum in said drum rotational direction;

calculating a first angle representing angular displacement from said second strip end sensor to said first strip end ~~senor~~ sensor in the drum rotational direction based on output from said angle detector;

detecting arrival of a trailing end of said strip member at said first strip end sensor brought about by rotating said drum in said drum rotational direction;

completing said second angular measurement using said angle detector when said trailing end of said strip member is detected by said first strip end sensor to yield a second angle;

calculating an overlap length if said second angle is greater than said first angle and calculating a gap length if said second angle is less than said first angle;

determining whether one of said overlap length and said gap length is outside an allowable range; and

sounding an alarm in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

9. (Currently Amended) The method of claim 8 wherein:

said overlap length is calculated using the formula

$$X=(D + 2t)\pi \times ((\theta_1 - 0_0)/360)$$

when said second angle is greater than said first angle, where:

X=said [[gap]] overlap length;

D=a diameter of said drum;

t= a thickness of said strip member;

θ_0= said first angle; and

θ_1= said second angle; and

said gap length is calculated using the formula

$$Y=(D + 2t)\pi \times ((\theta_0 - \theta_2)/360)$$

when said first angle is greater than said second angle and where θ_2 equals said second angle and Y equals said gap length.

10. (Previously Presented) A method of winding a strip member on a drum of a tire building machine, comprising:

providing a first strip end sensor directed at a first detection position on said drum whereat said strip member is brought into initial contact with said drum;

providing a second strip end sensor directed at said drum and angularly displaced from said first strip end sensor;

providing a an angle detector to detect an angle of rotation of said drum;

rotating said drum in a drum rotational direction while delivering a front end of said strip member to said drum to begin wrapping said strip member on said drum;

detecting said front end of said strip member using said first strip end sensor and initiating a first angular measurement using said angle detector;

detecting arrival of said front end of said strip member at said second strip end sensor;

completing said first angular measurement using said angle detector and initiating a second angular measurement when said front end of said strip member is detected by said second strip end sensor and continuing to rotate said drum in said drum rotational direction;

calculating a first angle representing angular displacement from said second strip end sensor to said first strip end ~~senor~~ sensor in the drum rotational direction based on output from said angle detector;

detecting arrival of a trailing end of said strip member at said first strip end sensor brought about by rotating said drum in said drum rotational direction;

completing said second angular measurement using said angle detector when said trailing end of said strip member is detected by said first strip end sensor to yield a second angle;

calculating an overlap length if said second angle is greater than said first angle and calculating a gap length if said second angle is less than said first angle;

determining whether one of said overlap length and said gap length is outside an allowable range; and

stopping the winding operation of the tire in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

11. (Currently Amended) The method of claim 10 wherein:

said overlap length is calculated using the formula

$$X=(D + 2t)\pi \times ((\theta_1 - \theta_0)/360)$$

when said second angle is greater than said first angle, where:

X=said [[gap]] overlap length;

D=a diameter of said drum;

t= a thickness of said strip member;

θ_0= said first angle; and

θ_1= said second angle; and

said gap length is calculated using the formula

$$Y=(D + 2t)\pi \times ((\theta_0 - \theta_2)/360)$$

when said first angle is greater than said second angle and where θ_2 equals said second angle and Y equals said gap length.

Docket No. F-7906

RESPONSE UNDER 37 CFR 1.116
EXPEDITED PROCEDURE
EXAMINING GROUP 1733

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Kentaro SHIMIZU, et al.
Serial No.	:	10/628,612
Filed	:	July 24, 2003
For	:	METHOD FOR WINDING STRIPS ON A TIRE BUILDING MACHINE
Group Art Unit	:	1733
Examiner	:	Geoffrey L. Knable
Customer No.	:	000028107

Certificate of Facsimile Transmission Under 37 CFR 1.8
I hereby certify that this correspondence is being transmitted in accordance with 37 CFR §1.6(d) to the United States Patent Office addressed to COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450 on July 6, 2006 to facsimile no. 571 273 1220
TOTAL NUMBER OF PAGES TRANSMITTED: 31

Herbert F. Ruschmann
(Name)

(Signature)

Attachment to 7-6-06 Int. Summary

7-6-06

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUBMISSION IN RESPONSE TO INTERVIEW REQUEST

Sir:

In accordance with interview discussions with the Examiner on July 6, 2006, applicant submits the following materials requested by the Examiner.

CLAIM LISTING OF CLAIM AMENDMENTS AUTHORIZED DURING JULY 6, 2006, INTERVIEW

1. (Canceled)

2. (Currently Amended) A method of winding a strip member on a drum of a tire building machine in a winding operation building a tire, comprising:

providing a first strip end sensor directed at said drum ~~in a direction~~ at a first position along a path of rotational advance of a surface of said drum which is angularly displaced along [[a]] said path of rotational advance ~~of said drum~~ from an angular position along said path of rotational advance whereat said strip member is brought into initial contact with said drum in order to detect a first detection position on said surface of said drum whereat said strip member is brought into initial contact with said drum;

providing a second strip end sensor directed at a second position along said path of rotational advance of said surface of said drum [[and]] which is angularly displaced from said first position along said path of rotational advance at which said first strip end sensor is directed;

providing [[a]] an angle detector to detect an angle of rotation of said drum;

rotating said drum in a drum rotational direction while delivering a front end of said strip member to said drum to begin wrapping said strip member on said drum;

detecting said front end of said strip member at said first detection position using said first strip end sensor and initiating a first angular measurement using said angle detector;

detecting arrival of said front end of said strip member at said second strip end sensor;

completing said first angular measurement using said angle detector and initiating a second angular measurement when said front end of said strip member is detected by said second strip end sensor and continuing to rotate said drum in said drum rotational direction;

calculating a first angle representing angular displacement from said second strip end sensor to said first strip end ~~senor~~ sensor in the drum rotational direction based on output from said angle detector;

detecting arrival of a trailing end of said strip member at said first strip end sensor brought about by rotating said drum in said drum rotational direction;

completing said second angular measurement using said angle detector when said trailing end of said strip member is detected by said first strip end sensor to yield a second angle; and

calculating an overlap length if said second angle is greater than said first angle and calculating a gap length if said second angle is less than said first angle.

3. (Currently Amended) The method of claim 2 wherein:

said overlap length is calculated using the formula

$$X=(D + 2t)\pi \times ((\theta_1 - \theta_0)/360)$$

when said second angle is greater than said first angle, where:

X=said [[gap]] overlap length;

D=a diameter of said drum;

t= a thickness of said strip member;

θ_0= said first angle; and

θ_1= said second angle; and

said gap length is calculated using the formula

$$Y=(D + 2t)\pi \times ((\theta_0 - \theta_2)/360)$$

when said first angle is greater than said second angle and where θ_2 equals said second angle and Y equals said gap length.

4. (Previously Presented) The method of claim 3 further comprising:

determining whether one of said overlap length and said gap length is outside an allowable range; and

stopping the winding operation of the tire in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

5. (Previously Presented) The method of claim 3 further comprising:

determining whether one of said overlap length and said gap length is outside an allowable range; and

sounding an alarm in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

6. (Previously Presented) The method of claim 2 further comprising:

determining whether one of said overlap length and said gap length is outside an allowable range; and

stopping the winding operation of the tire in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

7. (Previously Presented) The method of claim 2 further comprising:

determining whether one of said overlap length and said gap length is outside an allowable range; and

sounding an alarm in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

8. (Currently Amended) A method of winding a strip member on a drum of a tire building machine, comprising:

providing a first strip end sensor directed at a first detection position on said drum whereat said strip member is brought into initial contact with said drum;

providing a second strip end sensor directed at said drum and angularly displaced from said first strip end sensor;

providing [[a]] an angle detector to detect an angle of rotation of said drum;

rotating said drum in a drum rotational direction while delivering a front end of said strip member to said drum to begin wrapping said strip member on said drum;

detecting said front end of said strip member using said first strip end sensor and initiating a first angular measurement using said angle detector;

detecting arrival of said front end of said strip member at said second strip end sensor;

completing said first angular measurement using said angle detector and initiating a second angular measurement when said front end of said strip member is detected by said second strip end sensor and continuing to rotate said drum in said drum rotational direction;

calculating a first angle representing angular displacement from said second strip end sensor to said first strip end ~~senor~~ sensor in the drum rotational direction based on output from said angle detector;

detecting arrival of a trailing end of said strip member at said first strip end sensor brought about by rotating said drum in said drum rotational direction;

completing said second angular measurement using said angle detector when said trailing end of said strip member is detected by said first strip end sensor to yield a second angle;

calculating an overlap length if said second angle is greater than said first angle and calculating a gap length if said second angle is less than said first angle;

determining whether one of said overlap length and said gap length is outside an allowable range; and

sounding an alarm in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

9. (Currently Amended) The method of claim 8 wherein:

said overlap length is calculated using the formula

$$X=(D + 2t)\pi \times ((\theta_1 - \theta_0)/360)$$

when said second angle is greater than said first angle, where:

X=said [[gap]] overlap length;

D=a diameter of said drum;

t= a thickness of said strip member;

θ_0= said first angle; and

θ_1= said second angle; and

said gap length is calculated using the formula

$$Y=(D + 2t)\pi \times ((\theta_0 - \theta_2)/360)$$

when said first angle is greater than said second angle and where θ_2 equals said second angle and Y equals said gap length.

10. (Currently Amended) A method of winding a strip member on a drum of a tire building machine, comprising:

providing a first strip end sensor directed at a first detection position on said drum whereat said strip member is brought into initial contact with said drum;

providing a second strip end sensor directed at said drum and angularly displaced from said first strip end sensor;

providing [[a]] an angle detector to detect an angle of rotation of said drum;

rotating said drum in a drum rotational direction while delivering a front end of said strip member to said drum to begin wrapping said strip member on said drum;

detecting said front end of said strip member using said first strip end sensor and initiating a first angular measurement using said angle detector;

detecting arrival of said front end of said strip member at said second strip end sensor;

completing said first angular measurement using said angle detector and initiating a second angular measurement when said front end of said strip member is detected by said second strip end sensor and continuing to rotate said drum in said drum rotational direction;

calculating a first angle representing angular displacement from said second strip end sensor to said first strip end ~~senor~~ sensor in the drum rotational direction based on output from said angle detector;

detecting arrival of a trailing end of said strip member at said first strip end sensor brought about by rotating said drum in said drum rotational direction;

completing said second angular measurement using said angle detector when said trailing end of said strip member is detected by said first strip end sensor to yield a second angle;

calculating an overlap length if said second angle is greater than said first angle and calculating a gap length if said second angle is less than said first angle;

determining whether one of said overlap length and said gap length is outside an allowable range; and

stopping the winding operation of the tire in response to said one of said overlap length and said gap length being determined to be outside said allowable range.

11. (Currently Amended) The method of claim 10 wherein:

said overlap length is calculated using the formula

$$X=(D + 2t)\pi \times ((\theta_1 - \theta_0)/360)$$

when said second angle is greater than said first angle, where:

X=said [[gap]] overlap length;

D=a diameter of said drum;

t= a thickness of said strip member;

θ_0= said first angle; and

θ_1= said second angle; and

said gap length is calculated using the formula

$$Y=(D + 2t)\pi \times ((\theta_0 - \theta_2)/360)$$

when said first angle is greater than said second angle and where θ_2 equals said second angle and Y equals said gap length.

REMARKS

INTERVIEW ACKNOWLEDGMENT

Applicant appreciates the Examiner conducting the interview of July 6, 2006, in this application during which the above listed claim amendments were agreed to as overcoming the claim rejections in the Office Action January 6, 2007, under 35 USC §112, first and second paragraphs.. Applicant further greatly appreciates the Examiner's agreeing to enter the above amendments by Examiner's amendment.

In response to the Office Action indicating that the previously submitted substitute specification apparently contained printing errors which applicant believes were caused by defects in the facsimile transmission, applicant submits herewith a further copy of the substitute specification and abstract previously filed wherein amendments are effected to place the text thereof into proper English in accordance with 37 CFR 1.125(c). No new matter is added. Entry of the substitute specification and abstract is respectfully requested.

REQUEST FOR EXTENSION OF TIME

Applicant respectfully requests and authorizes a three month extension of time for responding to the Office Action. Please charge the fee of $1020.00 for the extension of time to Deposit Account No. 10-1250.

If there is any discrepancy between the fee(s) due and the fee payment authorized in the Credit Card Payment Form PTO-2038 or the Form PTO-2038 is missing or fee payment via the Form PTO-2038 cannot be processed, the USPTO is hereby authorized to charge any fee(s) or fee(s) deficiency or credit any excess payment to Deposit Account No. 10-1250.

If there is any reason this submission is not sufficient to place the case into condition for allowance, applicants respectfully request that the Examiner contact applicants' attorney.

In light of the foregoing, the application is now believed to be in proper form for allowance of all claims and notice to that effect is earnestly solicited.

Respectfully submitted,

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SUBSTITUTE SPECIFICATION

F-7906 Ser. No. 10/628,612

METHOD FOR WINDING STRIPS ON THE BUILDING MACHINE

This is a Continuation of Application Serial No. 09/804,567 filed March 12, 2001, now issued as U.S. Patent No. 6,602,367, which is a Divisional of 08/943,068 filed October 2, 1997, now abandoned, which is a Continuation of 08/625,989 filed April 1, 1996, now abandoned, which is a Continuation of 08/400,302 filed March 16, 1995, now abandoned, which is a Continuation of 08/187,775 filed January 26, 1994, now abandoned, which is a Continuation of 07/666,099 filed March 7, 1991, now abandoned.

BACKGROUND OF THE INVENTION

1. Technical Field

The inventions disclosed in this application relate to methods for winding an automotive tire building strip member on a building drum.

More particularly, the first invention in this application provides a method for winding a strip member, such as rubberized steel cord, tread rubber or the like, precut to the circumferential length of the building drum of a tire

building machine, on the building drum in such a manner that both ends of the strip member will be exactly abutted against each other on the drum.

The second invention in this application relates to an automotive tire building device wherein the lapping margin of ends of a strip member wound on a building drum can be automatically measured.

2. Prior Art

In winding a tire strip member on a building drum, it is at times required to insure exact abutment of its ends and at other times required that the lapping margin (positive and negative) be within certain allowable limits.

As a technology for insuring exact abutment of both ends of a strip member, such as rubberized steel cord or tread rubber, in the winding thereof on the building drum of an automotive or other tire building machine, there is known a method described in Japanese Patent Publication No. 61-32980. According to this method, the length of the strip precut to the circumferential length of the building drum is measured and, then, a leading portion, of predetermined length, of the strip is taken up on the building drum at the feeding

(takeup) speed equal to the peripheral speed of the drum. Then, the feeding speed relative to the building drum speed is altered to either compress or stretch the strip while its intermediate portion is wound on the building drum. Finally, the feeding speed is re-equalized with the peripheral speed of the building drum to wind up the remaining portion of the strip member on the drum.

However, the strip member tends to shrink with the progress of time after cutting and the time to termination of shrinkage and the amount of shrinkage is dependent on the environment and other conditions. Under certain conditions, the amount of post-cutting shrinkage reaches as much as about 0.5%. Mor over, the length of the strip member varies with the magnitude of the tension that acts on the strip when it is transferred from a transfer conveyer to the building drum and the pressure of contact between the strip and the drum. In the prior art method mentioned above the total length of the strip member is measured while it is undergoing shrinkage after cutting and the ratio of the feeding speed to the peripheral speed of the building drum is set according to the length value thus found so as to compress or stretch the intermediate portion of the strip. As a consequence, the aforesaid ratio is often irrelevant and there occurs an excess or a shortage of compression or stretching of the strip member,

thus causing a lapping of the leading and trailing ends of the strip member or a gap therebetween.

Therefore, in the first invention in this application provides a winding method which insures exact abutment of the ends or abutment without an appreciable overlap or gap.

Furthermore, in the process of manufacture of an automotive tire, not only the steel cord and tread rubber mentioned above but a variety of other rubber-based strip members are cut to length and both ends thereof are joined to build single-layer or multi-layer ring or cylindrical members. For example, on the primary building machine, an inner liner (a strip member of rubber) and a plurality of ply cords (rubberized fiber cords or steel cords), all precut to the circumferential length of the building drum, are laid up on the peripheral surface of the drum. In the secondary building machine, two steel belts (rubberized steel cords), a cap ply (rubberized nylon cord), etc. are laid up some of these different strip members are not joined by abutment at ends as described above but are joined by lapping the trailing end over the leading end on the drum. As mentioned above, the strip member has the property to shrink on standing after cutting to length as mentioned above and the amount of this shrinkages varies

with changes in environment. Also as mentioned above, the length of the strip member is altered by external forces that act on the strip when it is transferred from the conveyer to the drum. Therefore, even if the strip member has been cut precisely to length, a variation is inevitable in the degree of lapping of both ends. Therefore, it is common practice for the operator to trim off the rubber or cord at the trailing end when the degree of lapping is too large or unwind the strip partway and rewind it with stretching when there is a gap between ends.

However, the conventional tire building machine is not equipped with very effective means for inspecting the end joint of the strip member and the current trend toward automation of tire building cannot completely avoid a risk of products with the surplus or deficiency in end lapping being shipped uncorrected and marketed.

Accordingly the second invention in this application provides a tire building device which is capable of detecting a surplus or deficiency in end lapping while a strip member is wound on a building drum of the primary or second building machine.

SUMMARY OF THE INVENTION

The method for winding a strip member on a tire building machine in accordance with the first invention in this application comprises feeding a strip member to a building drum by means of a transfer conveyer, taking up the strip member on the building drum while controlling the speeds of the transfer conveyer and building drum and joining free ends of the strip member, which method is characterized by setting the feeding speed of the transfer conveyer and the peripheral speed of the building drum to equal values, taking up a leading portion, of predetermined length, of the strip member on the building drum, detecting the position of a trailing end of the strip member on the transfer conveyer to calculate the length of a trailing portion following the leading portion of the strip member, setting the ratio of the feeding speed of the transfer conveyer to the peripheral speed of the building drum to the ratio L/Lo, where L is the length of the trailing portion and Lo is the residual circumferential length of the building drum, only when the L/Lo ratio is within a set range and taking up the trailing portion of the strip member, while the takeup of the trailing portion of the strip member is stopped when the ratio L/Lo deviates out of the set range.

Thus, after completion of the takeup of a leading portion of the strip member or just before the beginning of takeup of a trailing portion of the strip

member, the length of the trailing portion is measured and the trailing portion is wound only when the ratio L/Lo of the length of the trailing portion of the strip member to the residual circumferential length Lo of the building drum is within a set range, with the ratio of the feeding speed to the peripheral speed of the building drum being set to the ratio L/Lo, with the result that the error of length L of the trailing portion of the strip member is minimized to preclude an excessive overlap or gap between ends of the strip member, thus leading to exact abutment of the ends or a minimum of overlap or gap.

The length of the leading portion of the strip member is preferably set to 30.about.80% of one circumferential length of the building drum. If the set length is less than 30%, installation of a leading end sensor is difficult. Conversely if the set length is over. 80%, the stretching or compression of the strip member is concentrated in the trailing portion thereof to adversely affect the quality of the product.

The ratio L/Lo applicable to the case of continued takeup of the trailing portion of the strip member is preferably set within the range of 0.995.about.1.005. Outside of this range, the amount of stretching or compression becomes too great to insure the proper winding.

The method of winding the strip member in accordance with the second invention in this application comprises using a tire building machine having a building drum for taking up a tire building strip member of predetermined length endlessly and a transfer conveyer for feeding the strip member to the building drum, which method is characterized by detecting the winding-start end of the strip member transferred from the transfer conveyer to the building drum and the winding-finish end of the strip member with end sensors, measuring the angle through which the building drum has rotated from the output of a winding start signal to the output of a winding finish signal in response to output signals from the sensors by means of an angle detector, and calculate a lapping margin between the winding start end and the winding finish end of the strip member based on the rotational angle and diameter of the building drum by means of an operational means.

In the above method, since the lapping margin between the two ends of the strip member is calculated by the operational means, the building operation can be continued while the lapping margin is within a preset allowable range or the operation can be discontinued or an alarm be actuated when the lapping margin deviates out of the allowable range, that is to say when the lapping margin is too large or too small. Therefore, in the automatic building process for

car tires, the risk of products with lapping defects being shipped can be effectively prevented.

It may be so arranged that one end sensor of the above-described type is used to detect both the winding start and winding, finish ends of the strip member or that two such end sensors are installed apart from each other by an optional angle along the circumferential direction of the building drum so that one of the sensors is used to detect the winding start end with the other sensor detecting the winding finish end.

Furthermore, a still more improved accuracy may be insured by installing end sensors in a plurality of positions, for example in the center and in positions on both sides thereof, Moreover, to cope with the case in which one strip member has an intermediate joint of material and this joint builds a step, it may be so arranged that the trailing end sensor is rendered operative only within a certain range, for example in the range of 5 mm, before and after the winding start end, whereby the risk of the joint being mistaken for the winding finish end and detected as such.

In the second invention in this application, the lapping margin of the strip member wound on the building drum includes both a positive value and a negative value. In other words, the case in which the two ends of the strip member actually overlap and the case in which there is a gap between the ends are included. The winding operation is stopped when the actual overlap or gap is too great or too small.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view showing an example of the first invention in this application.

FIG. 2 is a view similar to FIG. 1, showing an example of the second invention in this application.

FIGS. 3 and 4 each is a schematic side view of the building drum, which explains the operation of the example shown in FIG. 2.

DETAILED DESCRIPTION

FIG. 1 shows an example of the first invention in this application.

As illustrated, A stands for a tire steel belt, that is to say a strip member, 1 for a transfer conveyer therefor, 2 for an end pulley, 3 for a guide pulley, 4 for a drive pulley, and 5 for a building drum. The drive pulley 3 is connected to a drive shaft of a transfer servo motor 6 and the rotation of this servo motor 6 is controlled by a transfer servo amplifier 7. The rotational speed of the transfer servo motor 6 is detected by a pulse oscillator 8 and fed back to the servo amplifier 7. On the other hand, the building drum 5 is connected to a drive shaft of a drum servo motor 9 and the rotation of this drum servo motor 9 is controlled by a servo amplifier 10. The rotational speed of the drum servo motor 9 is detected by a pulse oscillator 11 and fed back to the servo amplifier 10.

Disposed over the building drum 5 is a leading end sensor 12 for contactless detection of a front end Aa of the strip member A and an output of the leading end sensor 12 is connected to a sensor amplifier 13. On the other hand, a trailing sensor 14 for detecting the position of the trailing end Ab of strip member A is installed over the transfer conveyer 1. Output terminals of the

trailing end sensor 14 and the sensor amplifier 13 are respectively connected to a trailing length meter 15 for calculating the length L of a trailing portion (the length from point P to Ab) of the strip member A. When the leading portion of strip member A is progressively wound on the building drum 5 and the leading end Aa of strip member A is detected by the leading end sensor 12, the trailing end sensor 14 detects the position of the trailing end Ab of strip member A and the trailing length meter 15 calculates the length L of the trailing portion of A which is still to be wound on the building drum 5.

The output terminal of the trailing length meter 15 is connected to a speed ratio calculator 16. This speed ratio calculator 16 calculates the ratio L/Lo of the length L of the trailing portion to a length of strip member A which is still to be wound on the building drum 5, that is the residual circumferential length Lo (length from point P to Aa) and transmits a signal corresponding to the ratio to the transfer servo amplifier 17 and drum servo amplifier 10. Only when the ratio L/Lo is within a set range, the transfer conveyer 1 and building drum 5 are driven at a speed ratio corresponding to the ratio L/Lo. On the other hand, when the ratio L/Lo deviates from the set range, the transfer conveyer 1 and building drum 5 are respectively stopped.

In winding a strip member A having a total length of 2,000 mm on a building drum having a circumferential length of 2,000 mm, the length of the leading portion of strip member A is set to 1,500 mm (75% of the total length) and the speed of the transfer conveyer 1 and the peripheral speed of the building drum 5 are set to the same value. In this condition, the leading portion, which is 1,500 mm long, of the strip member A is taken up on the drum. As the leading end Aa of this strip member A is detected by the leading end sensor 12, the trailing end sensor 15 detects the position of the trailing end Ab of strip member A and the trailing end length meter 15 calculates the length L of the trailing portion of the strip member A. Then, the ratio L/Lo of this length L of the trailing portion to the known residual circumferential length Lo of the building drum 5 is calculated and when this ratio L/Lo is within the range of 0.995 to 1.005, (when L/Lo is -2.5 mm ~ 0 mm), the ratio between the peripheral speed of the building drum 5 and the feeding speed of the transfer conveyer 1 is set to the L/Lo so that the strip member A is taken up under tension, i.e. under a stretching force, on the building drum, whereby the leading and trailing ends of the strip member A are exactly abutted against each other without any surplus or deficiency. However, when the ratio L/Lo deviates from the above-mentioned range, the transfer belt 1 and the building drum 5 are respectively stopped and the strip member A is removed.

FIGS. 2 through 4 show an embodiment of a second invention in this application.

Referring to FIG. 2, A stands for a strip member, 1 for a transfer conveyer, 2 for a belt pulley and 5 for a building drum. The building drum 5 and transfer conveyer 1 are driven in the direction of the arrow marks to wind the strip member A on the building drum 5.

Along the path in the direction of advance of the building drum 5 from point P where the strip member A begins to contact the drum 5, there are provided a first end sensor 25 and a second end sensor 26. The end sensors 25 and 26 each comprise a photoelectric element which photoelectrically detects the end of the strip member A. Connected to the building drum 5 is an angle detector 30 through a toothed pulley 27, a toothed belt 28 and a toothed pulley 29. The output terminals of the first end sensor 25, second end sensor 26 and angle detector 30 are respectively connected to an operational unit 31 which calculates a degree of end lapping of the strip member A.

In the above arrangement, as the building drum 5 and transfer conveyer 1 are driven to take up the strip member A on the building drum 5 and the leading end Aa of the strip member A reaches the position of the first end sensor 25, the angle detector 30 is actuated and as the same leading end Aa then reaches the position of the second end sensor 26, the angle of rotation of the building drum 5 from the time of detection of the leading end Aa by the first end sensor 25 to the time of detection of the same end Aa by the second end sensor is measured. Then, based on this measured angle of rotation, the angle.theta..sub.0 (degrees) from the second end sensor 26 to the first end sensor 25 is calculated and stored by the operational unit 31 and, at the same time, the indicator of the angle detector 30 is reset to zero. Then, as the first end sensor 25 detects the trailing end Ab of strip member A (FIGS. 3 and 4), the building drum 5 stops rotating and the angles of rotation.theta..sub.1 and.theta..sub.2 (degrees) are measured.

FIG. 3 shows the situation where the angle of rotation.theta..sub.1 (degrees) is larger than the angle.theta..sub.0 between the two end sensors 25 and 26 and the end Aa and Ab of the strip member A overlap. The lapping margin X in this situation is defined as follows.

$$(D + 2t)\,\pi \times \frac{\theta_1 - \theta_0}{360} = X$$

where D is the diameter of the building drum 5 and t is the thickness of strip member A.

This value of X is calculated by the operational means 71.

FIG. 4 shows the situation where the angle of rotation.theta..sub.2 (degrees) is smaller than the angle.theta..sub.0 between the two end sensors 25 and 26 and there is a gap between the ends Aa and Ab of the strip member A. The gap Y in this situation is given by the following equation

$$(D + 2t)\,\pi \times \frac{\theta_0 - \theta_2}{360} = Y$$

where D is the diameter of the building drum 5 and t is the thickness of the strip member A.

This value of Y is calculated by the operational means 31.

While the above embodiment employs two end sensors 25 and 26, the second end sensor 26 shown in FIG. 2 may be dispensed with and only the first end sensor 25 be used to determine the angle corresponding to approximately one turn. However, when two end sensors are used in the above embodiment, the change in length between the two sensors 25 and 26 can be disregarded and a more accurate measurement can be realized. It should be understood that in building the second and subsequent layers of strip member A, the thickness of strip member A already taken up is added to the diameter D of the building drum.

Abstract

A strip member is wound by a tire building machine having a building drum for taking up a strip member of predetermined length without discrete ends and a transfer conveyor for feeding the strip member to the building drum. The winding-start end of the strip member transferred from the transfer conveyor to the building drum and the winding-finish end of the strip member are detected by means of end sensors, measuring the angle through which the building drum has rotated from the output of a winding start signal to the output of a winding finish signal in response to output signals from the sensors by means of an angle detector. A lapping margin between the winding start end and the winding finish end of the strip member is calculated based on the rotational angle and diameter of the building drum by means of an operational means.